

**Process for the production of multi-component mineral  
substance preparations**

5    The submitted invention concerns a process for the production  
of multi-component mineral substance preparations.

10    The production of plant minerals for health reasons is known  
about and understood, particularly the use of incineration  
processes. Plant minerals have the advantage over  
synthetically composed mineral substance preparations of  
containing a broader and more homogeneous mineral substance  
spectrum, whereby based on the fundamental concept it is  
guaranteed that the danger of an overdose of individual  
15    minerals hardly exists, as long as each nutritional  
physiological dose represents a sensible amount of the plant  
in question.

20    In accordance with DE 3727417A, mineral substance  
preparations are simply created by the incineration of  
organic or plant materials. Thereafter the preparation in  
question is simply produced by a discontinuous temperature  
treatment of plant materials up to 920°C.

25    However, the problem with this lies, above all, in the area  
of the process technique, mainly in the efforts to obtain an  
extremely pure preparation free of harmful substances. In a  
technically sound executable process it is essential to  
decontaminate the product discontinuously through by-products  
30    which can have here a powerfully toxic effect. In addition,  
it is very desirable from the nutritional and physiological

point of view that the mineral substance matrix be virtually completely insoluble, to transfer over to bio-available forms. This theme will however not be examined here.

5 In JP 04016164A, the embodiment of mineral substance preparations based on incinerated organic substances is described, whereby the ashes extracted are either acidulous or neutral. Here too, neither the problem of harmful substances produced in the incineration process, nor the  
10 possibilities concerning how the non-extractable mineral substance component is obtained is examined.

According to JP 2001292725A, in order to obtain a neutral salt with high solubility, one extracts a plant with the name  
15 salicornia using hot water, then dries and incinerates the extract for 4 hours. Using this method easily soluble minerals like potassium and sodium are obtained. However, on the other hand and for the most part, rare element trace minerals are not released by water extraction from raw plant  
20 material and therefore also do not end up in the product, by which process on the other hand the natural, plant-filtered mineral spectrum becomes distorted.

In summary, it may be said concerning the current method or  
25 prior art is dependent on the quality, i.e. the usability or the toxicity, of mineral substance preparations based on ash which are very sensitive to contamination by harmful substances, which is neither discussed nor addressed in the processing technique.

30

In addition, it can be determined that the process described in the literature is exclusively carried out in batch processes and this with very small product quantities. The developed processes do not allow any technical up-scaling.

The technical solution involving the incineration of substances free of harmful elements is absolutely and critically dependent upon the pure product not being  
5 contaminated with half-complete material; the complexity is due to the fact that the intermediate product, the primarily oxidized material, is highly toxic and any contamination of the end product must be herewith excluded, i.e. the transport of the mineralized product in the process must be completely  
10 controllable and reproducible.

The immense volume reduction during the incineration process is especially difficult, where an inhomogeneous mixture of completely incinerated and only partially incinerated areas  
15 results. Therefore, the situation whereby evaporating and harmful gasses are absorbed into the ashes and thereby contaminating them is a problem which is it is not possible to overcome with the help of the present state of the equipment.

20 The purpose of the submitted invention is the creation of a multi-component mineral substance preparation, which is as complete as possible, and which also contains all minerals which guarantee and strengthen the vitality of our bodies and  
25 which is free of substances which may be a health concern, as well as the details of the related process. The fundamental factor is that the product is already guaranteed free of harmful substances during the production process, since for example a crystallization process cannot be applied as a  
30 purification step because important trace elements/minerals would be lost in the process.

These problems are solved in accordance with the invention by the distinctive features of the Independent Patent Claims.

The process according to the invention for the production of multi-component mineral substance preparations, which are free of harmful substances, contains in particular the following steps:

5

a. Primary thermal-oxidative treatment of organic raw materials, of plant or animal origin, in a primary temperature treatment zone;

10 b. Transport of the product of the primary thermal-oxidative treatment into a second temperature treatment zone;

c. Secondary thermal-oxidative treatment of the product of the primary thermal-oxidative treatment in a second  
15 temperature zone.

On the grounds of simplicity, the following will be abbreviated thus:

Primary thermal-oxidative treatment will also be referred to  
20 as primary oxidation. Secondary thermal-oxidative treatment as secondary oxidation.

The product of the primary thermal-oxidative treatment as primary oxidate.

The product of the secondary thermal-oxidative treatment as  
25 secondary oxidate.

The primary thermal oxidative treatment involves the usual incineration, whereby the focus in terms of the technical process is on how the ashes, in other words, the primary  
30 oxidate, can be made as powdery as possible and therefore the oven parameters can be set in such a way that when implementing autothermic operation as extensively as possible, a safe margin in relation to the ash melting temperature is maintained, so that furnace ovens can be used.

The secondary thermal oxidative treatment, however, has the aim of reducing or minimizing the part of the remaining organic compounds and of carbonized carbon below the level  
5 that would give cause to health concerns using an autothermic method, as well as converting insoluble components of the primary oxidate into rudimentarily soluble forms.

The very insoluble residues themselves contain valuable trace  
10 and ultra-trace elements, which should of course be solubilized to the highest possible extraction. Here it has been shown that the process requirements, in which the baking or the melting of powder particles is achieved and by which these rudimentarily soluble forms occur to a heightened  
15 yield, are extremely useful.

The term "rudimentarily soluble forms" means those forms, which when soaking the secondary oxidate with acid, in particular with citric acid, become soluble or colloiddially  
20 soluble. Therefore as a rule, the secondary thermal oxidative treatment is performed at a higher temperature than the primary thermal oxidative treatment, typically at least 10°C, preferentially 30°C and especially preferred at least 50°C above the temperature of the primary thermal oxidative  
25 treatment. Nevertheless in individual cases the temperatures can also be more than 200°C above the temperature of the primary thermal oxidative treatment.

The tendentially resultant granulate and/or the molten  
30 material in the secondary thermal oxidative treatment is pulverized once again into a preferable embodiment of the invention.

Using the invention process, it is possible to raise the acid

solubility to at least 95%, preferably to at least 98%, and most preferably to above 99%, which in turn has the effect that a priori forms which are difficult to dissolve are over-proportionally solubilized and bio-available.

5

According to EP 0 891718 - example 1 - one obtains in a typical incineration process, even with raw materials with a relatively high soluble ash component, at best a 90% solubility of the ash deposits in acid. Depending on the raw material, an incineration temperature is selected which produces the most powdery and workable form of primary oxide. The selected temperature can be between 500° and 3000°C, preferably between 600°C and 1200°C, and most preferably is between 750°C and 1050°C.

15

The primary oxidant typically shows a maximum of 30%, preferably a maximum of 10% and most preferably a maximum of 3% of the original carbon content as organically combined carbon.

20

As a rule, the primary oxide is cooled off and sieved, typically with a sieve size smaller than 1 mm, although preferably with a size smaller than 0,2 mm, optionally and temporarily stored and then processed in a second temperature treatment zone. The separation in situ of both temperature treatment zones can take place in an integrated production facility in the framework of a superordinate production plant which integrates both these zones, but the processes can also take place in two completely different production locations.

30

As organic raw materials, plant or animal origin, not only all seed plants (spermatophyte family) may be used but also algae. Also usable are seed plants, e.g. root, tuber, bulb, stem, leaf, seed and fruit types. Forage plants such as

grasses and beans may also be used. Plants with medicinally beneficial properties, e.g. field horse-tail (*Equisetum arvense*), adonis (*Adonis*), mandrake (*Mandragora*), arum (*Arum*), lemon peel, olive husks, wood, nettle, spinach, sugar beet, etc. may also be used. See table 1

**Table 1**

Artichoke

10 Horehound  
(*Marrubium vulgare*)

Angelica

Aniseed

Apple

15 Apfelkraut (*Herba Marrubii*),  
see Camomile

Arnica

Brook mint  
(*mentha aquatica*)

20 Valerian

Balsam fir

Bearberry  
(*Arctostaphylos uva-ursi*)

Common

25 clubmoss (*Lycopodium clavatum*)

Ramsons

(Allium ursinum)

Spicknel (Meum athamanticum)

Basil

Comfrey

5 Burnet (Pimpinella saxifraga)

Henbane (Hyoscyamus niger),

Birch (Betula lenta)

and moor birch

(Betula pubescens)

10 Pear

Marsh clover

(Menyanthes trifoliata)

Bittersweet

(Solanum dulcamara LINNÉ)

15 Hemp (Cannabis sativa L.)

Spiny restharrow

(Ononis spinosa)

Houseleek (Sempervivum)

Hazelnut

20 Bilberry (Vaccinium myrtillus)

Skullcap

(Scutellaria lateriflora)

Meadow saffron

(Colchicum autumnale)



Motherwort (*Leonurus cardiaca*)

Hay flowers (*Graminis flos*)

Raspberry

Shepherd's purse

5 (*Capsella bursa-pastoris*)

Elder (*Sambucus*)

Elderflower

Hops (*Humulus*)

Sweet clover

10 (*Melilotus officinalis*)

Coltsfoot

(*Tussilágo fárfara*)

Dog rose (*Rosa canina*)

Icelandic moss

15 (*Cetraria islandica*)

*Coffea arabica* (*Coffea arabica*)

California poppy

(*Eschscholzia californica*)

Common sweet flag

20 (*Acorus calamus*)

Camomile

(*Herba Marrubii*)

Rose

Rosemary

Horse-chestnuts (Aësculus)

Saffron

Sage

Woodland germander

5 (Teucrium scorodonia)

Common sea-buckthorn

(Hippophae rhamnoides)

Strawflower (Helichrysum

arenarium (L.) Moench)

10 European barberry

(Berberis vulgaris)

Horsetail (Sphenophyta)

Yarrow (Achilléa)

Hemlock (Apiaceae)

15 Opium poppy

Primrose

Echinacea

(Echinacea angustifolia)

Chive (Allium schoenoprasum L.)

20 Greater celandine

(Chelidonium majus)

Black elder (Sambucus nigra)

Black tea

- Iris (Iris)
- Celeriac (Apium graveolens)
- Stemless carline thistle  
(Carlina acaulis)
- 5 Blueberry (Vaccinium Cyanococcus)
- Wolfsbane (Aconitum)
- Purple loosestrife  
(Lythrum salicaria)
- Tormentil (Potentilla erecta)
- 10 Savory (Satureja)
- Borage (Borago officinalis)
- Nettle (Urtica)
- Blackberry  
(Rubus fruticosus agg.)
- 15 Smooth rupturewort  
(Herniaria glabra)
- Christ's thorn  
(Paliurus, spina-christi)
- Christmas rose
- 20 (Helleborus niger)
- Dill (Anethum graveolens)
- Burning bush (Dictamnus albus)
- Good King Henry  
(Chenopodium bonus Henricus)

Oregano (*Origanum vulgare*)

Sweet Violet (*Viola odorata*)

Rowan (*Sorbus aucuparia*)

Southern wood

5 (*Artemisia abrotanum*)

English hawthorn

(*Crataegus laevigata*

'Paul's Scarlet')

Gypsy weed (*Veronica*)

10 Ivy

Yew

Marshmallow

(*Althaea officinalis*)

Wolfsbane (*Aconitum*)

15 Verbena

(*Verbena officinalis*)

Strawberry

Tarragon

Eucalyptus

20 Buckthorn

Fig

Fennel

Buckbean

(*Menyanthes trifoliata*)

Foxglove

Flax (*Linum usitatissimum*)

Lady's mantle

Common daisy (*Bellis perennis*)

5 Silver weed  
(*Potentilla anserina*)

Poison arum

Yellow gentian

Yarrow or bloodwort  
10 (*Achillaea millefolium*)

Evening primrose

Ground-elder  
(*Aegopodium podagraria*)

Ginseng

15 Goldenrod

Pomegranate tree

Great burnet  
(*Sanguisorba officinalis*)

Ground ivy  
20 (*Glechoma hederacea* L.)

Bugle plant (*Ajuga*)

Good King Henry (  
*Chenopodium bonus-henricus*)

Oats

Poplar

Catechu (Acacia Catechu)

Corn poppy (Papaver rhoeas)

5 Salad burnet  
(Sanguisorba minor)

Burdock

Garlic

Mullein

10 Bluebottle

Pasqueflower

Pumpkin

Lavender

Lovage (Levisticum officinale)

15 Lime-tree blossom

Linden

Lime-tree blossom

Dandelion

Bay (Laurus nobilis)

20 Lungwort (Pulmonaria)

Lilly of the valley  
(Convallaria majalis)

see violet

Mallow (Malvaceae)

Milk thistle  
(Silybum marianum)

5 Sweet violet (Viola odorata)

Horse radish

Sea squill (Urginea maritima)

Masterwort (Peucedanum)

Mistletoe

10 Chaste tree

Evening primrose

Hellebore (Helléborus)

White hellebore  
(Veratrum album)

15 Agrimony

Oleander

Olive leaves

Oregano

Birthwort

20 (Aristolochia clematitis)

Palm lily

Passion flower

Peppermint

Peony

Pimpernel

Portulaca

5 Purple coneflower  
(Echinacea purpurea)

Wild thyme  
(Thymus serpyllum)

Quinoa

10 Quince

Tansy

Rue

Rhubarb root

Soy bean

15 Coneflower

Capsicum

Asparagus fern

Liquorice

Ribwort

20 Jimson weed

Holly

Pansy



Tobacco

Centaury

Tea shrub

Thyme

5 Banewort

Tomato

Morning glory

Martagon lily  
(*Lilium martagon*)

10 Violet

Rowan tree

Chickweed

Juniper

Scots pine  
15 (*Pinus sylvestris*)

Wild sage  
(*Teucrium scorodonia*)

Woodruff (*Galium odoratum*)

Clematis

20 Comfrey

Walnut tree

Gravel root

- Chicory (Cichorium)
- Willow bark
- Whitethorn
- White mustard seeds
- 5 White hellebore  
(Veratrum album)
- Silver fir
- Wormwood
- Basswood
- 10 Grecian foxglove  
(Digitalis lanata)
- Castor oil plant  
(Ricinus communis)
- Gall clover
- 15 Fern
- Hyssop
- Red Virginia creeper
- Horse tail  
(Equisetum arvense)
- 20 see field horse tail
- Hedge rose
- Red currant
- St. John's wort

Winter cherry

Castor oil plant  
(*Ricinus communis* L.)

Mangold

5 Red foxglove

Less preferably, but entirely possible are special animals or animal parts such as bones or special organs. From a medicinal standpoint the use of special plants or parts of animals is therefore important since there are those who  
5 would specifically like to implement the "natural" enrichment of a number of trace elements for therapeutic purposes. Especially high quality raw materials include grasses from certain mountain pastures that have not hitherto been intensively cultivated as well as sea algae.

10

Other high quality raw materials include leaves such as olive tree leaves, maple leaves, birch leaves, stinging nettle, aloe vera, thyme, etc. Especially preferable are root and root parts, for example, of wild and/or forest herbs,  
15 ginseng, etc. Also fungi and mycelium. Advantageous is in particular the use of extracted or compacted remains, as these represent very high quality mineral substances.

The secondary thermal oxidative treatment is preferentially  
20 carried out in a pushed-batt oven, a roller furnace or a conveyor furnace quasi-continuously. Also a externally heated revolving tube or an externally heated tube with a spiral conveyor can be used continuously. Unlike the primary thermal oxidative treatment, the secondary thermal oxidative  
25 treatment can be controlled by external heat sources, or optionally also controlled using microwaves.

In accordance with the invention, the process may be carried out using batch operation with two different heating zones,  
30 however an at least partly continuous processing is preferable, whereby preferentially the secondary oxidation is

carried out continuously.

According to the invention, the process additionally concerns a variant, by which at the site of the harvest the plants can  
5 already be primarily oxidized, the primary oxidate then transported to the site of the secondary oxidation and there be further processed according to the defined process.

The secondary thermal oxidative treatment can thereby be  
10 carried out in normal air, although it is advantageous to carry out the process with enriched or pure oxygen and/or water steam. The advantage of an enriched oxygen or water steam atmosphere is, on the one hand, the higher oxidative potential of the atmosphere, which supports the oxidation of  
15 the a priori inert precious metals, which thereby become better bio-available. In addition, the formation of nitric oxides is inhibited which otherwise would have a considerable toxic affect on the product.

20 Depending on the temperature range, the retention time in the second temperature treatment zone is typically set from 20 minutes up to 100 h, preferentially 2 h to 36 h. The simplest form of grinding can be carried out in a mortar or grinding mill. The grinding process can thereby be carried out in a  
25 dry state, however, it is advantageous to employ a wet process by which, as a rule, the particle size may be reduced much further. A dry and wet grinding process may also be combined. The wet grinding process is achieved preferably in a pH range of between 8 and 16, and especially preferably  
30 between 10 and 14. In this pH range, the ground substance has the lowest tendency to agglomerate. The grinding energy to be used in the grinding process is between 0.1 and 10 Wh/kg when using a bead mill.

The ground substance can further have organic acids added, in particular citric acid, vinegar, malic acid, ascorbic acid, lactic acid, acetic acid and vinegar, as well as similar mixtures.

5

Using a dry grinding process, it can be advantageous to fill the ground substance powder into capsules/gelatine capsules or compressed into tablets with a binding agent, preferably lactose.

10

By adding organic acids to the ground substance, in particular citric acid and/or malic acid and/or lactic acid and/or acetic acid, and also similar mixtures, colloidal solutions may be produced containing many trace elements and ultra-trace elements in cluster size which are for the most part smaller than 100 nm, as shown in illustration 1.

15

According to the invention, the mineral substance preparations may be used as nutritional supplements, food additives, beauty aids, medication, hereby the intake can be in particular either in oral, inhalative, intravenous, rectal or topical form.

20

Also advantageous from a health point of view is the case, whereby a juice or an extract made from the original raw material, or optional as a dried powder, finally a mineral solution created in accordance with the invention preferably in the described acidified form, combined with a foodstuff or a nutritional supplement, a balanced diet or an additive, which contains the most important nutritional physiological substances of the plant in question in highly concentrated form.

25

30

Mineral substance preparations produced accordingly can of

course be mixed with other minerals, wherein one would normally mix at least 2% of the mineral substance preparation produced in accordance with the invention in with the usual commercially-available mineral substance preparations, whereby the balance of the commercially-available preparations is clearly increased.

Of course, also the quality of any food can be improved by adding mineral substance preparations produced according to the invention.

10

Mineral substance preparations that are produced according to the process described in the invention are suitable as a broad spectrum medication also for remedies for which colloidal silver is recommended. Preparations produced according to the invention are especially effective for the following indications:

Heavy metal poisoning, chronic nausea, migraine, allergies, cardio-vascular diseases, high blood pressure. In connection with this, experts have observed a strong correlation between a deficiency in trace elements and the occurrence of disease.

20

The advantages of the process with respect to prior art can be described in summary as follows: Firstly multi-component mineral preparations of natural origin, which are free of harmful substances, are technically producible and available. A balanced, natural graduation of minerals and trace elements, as an optimal nutritional supplement to frequently demineralized food, helps refill the body's own mineral substance stores. In this way, users strengthen their immune system. A "natural mineral substance cocktail" is better tolerated during mineralization cures, without health-damaging situations occurring, since no unilateral strain can develop. Due to the high potassium/sodium levels body fluids are alkalized, i.e. the body pH increases and waste products

25

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are released resulting in the following:

Good blood pressure regulation; a prophylactic effect against cardio-vascular diseases; an increase in cell oxygenation; an  
5 increase of the energy in the body with an increase in the level of health and fitness.

**Application example:**

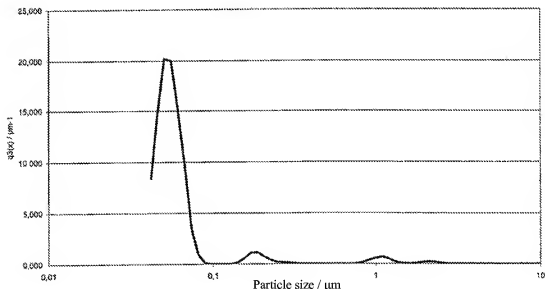
10 A mixture of wood was treated in a normal furnace oven and incinerated, i.e. treated in a primary thermal oxidative process at a temperature of approx. 800°C. The primary  
oxidate was sieved to 0.1 mm and still contained visible amounts of carbon particles which in particular, when the  
15 primary oxidate was put into water, collected on the water's surface. The sieved primary oxidate was placed in a porcelain crucible and then treated in a muffle kiln at 1100° for 24 h using a thermal oxidative process with oxygen flushing. The  
secondary oxidate was essentially molten and then scraped out  
20 of the crucible after cooling off. The secondary oxidate was ground in a ball mill and sieved to 0.1 mm. It contained neither visibly perceptible nor detectable organic or carbonized substance impurities when thermally analyzed.

25 The powder thus obtained is suitable for mixing into a wide variety of foodstuffs, for compressing into tablet form using, e.g. lactose or for filling gelatin capsules, etc. Additionally 1 kg of the secondary oxidate was pre-ground  
with 10 l of water in a grinding bead mill with beads of  
30 between 1.5 to 2.5 mm in size using an energy value of 0.5 Wh/kg (solid substance) and in a second pulverizing process was ground with beads of 0.3 - 0.4 mm in size using an energy  
value of 3 Wh/kg (solid substance).



2.0 g of the suspension obtained in this manner were set using citric acid to a pH value of between 3 and 4 and diluted with 150 ml water. The colloidal solution thus obtained was characterized by means of diffraction measurements (see Illustration 1) and examined using inductively coupled plasma mass spectroscopy (see Table 2).

**Figure 1**



10

Figure 1 note: the measurements were made by means of a laser diffraction spectroscope according to the PIDS method (Polarization Intensity Differential scattering) with a spectrometer of the type LS230 made by the firm Beckmann-Coulter GmbH / Krefeld, where the particle spectrum was calculated and recorded in relation to the volume density distribution  $q_3$  (see: H. Rumpf, "Mechanical Process Technique", Carl Hanser Verlag/ Munich/Vienna, 1995, p. 12-15).

20

**Table 2**

<b>Element</b>		<b>Wood (µg/g)</b>
Ti	Titanium	1560.10
V	Vanadium	35.56
Cr	Chrome	6462.90
Mn	Manganese	12775.48
Fe	Iron	24672.32
Co	Cobalt	19.87
Ni	Nickel	1062.50
Cu	Copper	458.90
Zn	Zinc	459.88
Ga	Gallium	9.88
Ge	Germanium	3.51
As	Arsenic	1.01
Y	Yttrium	288.40
Zr	Zirconium	5060.75
Nb	Niobium	5.62
Mo	Molybdenum	43.13
Ru	Ruthenium	0.00
Pd	Palladium	73.10

Ag	Silver	29.26
Cd	Cadmium	23.05
In	Indium	0.00
Sb	Antimony	2.87
Te	Tellurium	7.63
La	Lanthanum	14.42
Ce	Cerium	31.64
Pr	Praseodymium	3.69
Nd	Neodymium	11.44
Sm	Samarium	2.43
Eu	Europium	0.67
Gd	Gadolinium	1.73
Tb	Terbium	0.32
Dy	Dysprosium	1.74
Ho	Holmium	0.31
Er	Erbium	0.83
Tm	Thulium	0.13
Yb	Ytterbium	1.60
Lu	Lutetium	0.00
Hf	Hafnium	127.85
Ta	Tantalum	0.52

W	Tungsten	13.68
Re	Rhenium	0.00
Os	Osmium	0.00
Ir	Iridium	0.00
Pt	Platinum	1.20
Au	Gold	0,00
Hg	Mercury	0.00
Tl	Thallium	0.00
Pb	Lead	13.06
Bi	Bismuth	0.47
Th	Thorium	7.04
U	Uranium	3.21
B	Boron	1351.22
Al	Aluminum	38443.71
Si	Silicon	53238.96
P	Phosphorus	2713.10
S	Sulfur	14701.15
Se	Selenium	0.00
Br	Bromine	0.00
Li	Lithium	52.20
Be	Beryllium	0.00

Na	Sodium	19883.98
Mg	Magnesium	60715.70
K	Potassium	106809.43
Ca	Calcium	252354.22
Sc	Scandium	4.02
Rb	Rubidium	119.29
Sr	Strontium	2017.13
Cs	Cesium	1.31
Ba	Barium	1678.80

Further aspects of the invention are presented in the following text.

- 5 According to the current state of the art, mineral preparations are mainly mixed together from individual salts. The basis of the composition of the mixture is the assumption that ingesting a determined dose of minerals substantially present in the body is sensible; however the composition of
- 10 the mixture is consequently rather arbitrary, since medical expertise is not advanced enough to determine in particular what dosage recommendations for trace elements are generally valid. Trace elements such as zinc, molybdenum, chrome, gold, rhodium, platinum, nickel, cobalt, iridium, osmium are as a
- 15 rule not taken into account in mineral substance preparations with the result that a "synthetic" mixture of salts of various origins means that trace elements always administered in unnatural doses, especially also in relation to the "primary minerals" such as calcium, magnesium, and potassium.

There are indeed many opinions concerning the optimum dosage of minerals, however combining them is a science in itself; the necessary knowledge for this fills whole volumes of specialized literature. In particular, the influence of trace elements on our health and our well being is very difficult to determine; the possibilities of absolute and relative dosage of the trace elements in relation to each other are completely limitless. The big problem with dose recommendations for trace minerals is the insufficient analysis in the ultra-trace area, where one can basically only state that specific ions such as iridium, rhodium, platinum, gold, etc. occur in natural foodstuffs below the detectable limit - but only based on the chemistry of these forms. When considering the catalytic properties of their homogeneously dissolved complex forms, it is known that these forms are not comparable to anything else.

Even the most minute traces of specific interim metal complexes can have dramatic results and trigger the occurrence or non-occurrence of specific internal body reactions.

Since in all probability after an erroneous overdose of trace elements, even in extremely small amounts, serious consequences will occur, and these forms will then be removed from the range of commercially-available mineral substance preparations. The consequence is that such mineral substance preparations are relatively lacking in trace minerals.

Especially critical here is that due to intensive agriculture in industrial countries, the trace element content of fields is already very low anyway which also means that the trace element content of vegetables and fruit has been massively

weakened. Experts also estimate that our own body mineral deposits reduce significantly with age, which is a main factor for the increase in immunodeficiency diseases and cancer. Experts assume that synthetically composed mineral products, which often contain high doses of calcium, give cause for concern on health grounds: mineral substances have in particular the job of keeping body pH values as high as possible, to counteract chronic acidity, which more than 80% of the population in industrial countries suffer directly or indirectly and which represent the cause of cardio-vascular diseases, fungal diseases, parasite infestation and for reduced immune system activity. Acidosis is the increase of acid in the body's fluids, mainly of the lymph, as a result of nutrition; foods from which mineral substances have been removed such as flour and sugar are responsible for high acid levels.

Over the years, these acids in connection with alkaline earth deposits collect in particular calcium, as solid slag, also called poly-molecular alkaline earth salts, in our body and prevent the free circulation of blood and therefore the transport of oxygen into our cells. If one wishes to reverse this slag deposit process or least to slow it down, one has to use mineral substance preparations in order to raise the body's pH value and dissipate the poly-molecular alkaline earth salts which are difficult to dissolve.

This is exactly the effect that the simply mixed mineral salt preparations rich in calcium and magnesium do not have. Alkaline earth salts which are difficult to dissolve are not dissolved by even more alkaline earth. The opposite is the case: if one uses mineral substance preparations containing high levels of calcium and magnesium in order to raise the body's pH value, and then uses even higher doses, an acute

and very dangerous build up of further slag salts, which can greatly hinder or block the cardio-vascular system, can occur.

5 A further problem with the application and dosage of minerals is posed by those forms, which interfere with each other and should not be taken together. For example, molybdenum is considered an antagonist for cobalt, while copper on the other hand is considered to be an antagonist for zinc; see A  
10 Beginners Introduction to Trace Minerals, Erwin Dicyan Keats Publishing, Inc., New Canaan, Connecticut/USA.

When one considers that there currently more than 87 known trace elements, whose dosage can be altered, it becomes clear  
15 that the possibilities for synthetically mixing mineral substance preparations are infinitely great.

Therefore, if one only wanted to test the biological value in the most prevalent synthetic mineral substance preparations  
20 in long term test, the length of time required would hardly be quantifiable. Then there is the problem of dosing trace elements: the bio-availability and effectiveness in various modifications. Therefore the trace elements stored in edible plants are present, for example, in colloidal form, i.e. in  
25 metal cluster form. According to the opinion of leading experts, these clusters are much more valuable for our organisms than the corresponding salts. The best advice for composing mineral substance preparations is therefore to use of the actual mineralization of plants.

30

This brings us to the second approach for producing mineral substance preparations, the production of what are known as ash products. Here an attempt is made to incinerate mainly raw plant materials to obtain a balanced, naturally filtered



mineral substance preparation.

In accordance with DE 3727417A, mineral substance preparations are created simply by the incineration of organic or plant materials. Thereafter the corresponding preparation is simply created by a discontinuous temperature treatment of plant materials up to 920°C.

The problem with this however lies above all in the area of the process technique, mainly in the efforts to obtain an extremely pure preparation free of harmful substances. On the one hand, one is tempted to achieve a decomposition of the organic materials which is as complete as possible by using the highest temperature possible; however, on the other hand, one wants the temperature to be kept as low as possible in order to prevent the formation of nitric oxides. Using state of the art discontinuous and one-step incineration methods, extreme temperature fluctuations occur within the incinerated sample. This leads either to absorption of harmful substances in cold spots in the raw materials or to an incomplete oxidation of the raw materials; in the long run, both effects can render the entire product unusable. A suitable process technology therefore has a decisive influence on whether the product promotes health or whether it has a toxic effect. In no way does the indicated state of the art take into account the contamination by nitrate/nitrite or organic residual components.

A further problem with the current state of the art is the bio-availability of the trace minerals, which according to expert opinion is especially great if these trace minerals are present in a metallic state as a colloid. Some experts suspect that a cluster size of between 10 and 100 atoms represent the optimum for our bodies. In the current state of

the art, this is not explored.

- In JP 04016164A, the preparation of mineral substance preparations based on incinerated organic substances is described, whereby the ashes are extracted either acid based or neutrally extracted. However, the problems of harmful substances arising from the incineration process are not addressed.
- In order to obtain a neutral salt with high solubility, one extracts a plant with the name salicornia in accordance with JP 2001292725A using hot water, then dries and incinerates the extract over the course of more than 4 hours. This process obtains above all the easily soluble minerals such as potassium and sodium, whereas the trace minerals of the rarer elements are not released by the water extraction from the raw material of the plant and therefore do not end up in the product, whereby the natural, plant filtered mineral spectrum becomes distorted.
- In summary, it may be said concerning the current state of the art that the quality, i.e. the usability or the toxicity, of mineral substance preparations based on ash is very sensitive to and dependent on contamination by harmful substances. In addition, it is to be determined that the process described in the literature is exclusively carried out in batch processes and this with very small product quantities.
- This process does not allow any technical up-scaling, since the limited thermal conductivity and the dynamics of the flow and diffusion of a probe in the gram range are completely different from those in the kg range or in the ton range. The technical solution involving the incineration of substances

free of harmful elements is absolutely critically dependent upon the pure product not being contaminated with half complete material; the complexity is in the fact that the intermediate product, the primarily oxidized material, is highly toxic and any contamination of the end product must herewith be excluded, i.e. the transport of the mineralized product in the process must be completely controllable and reproducible. The immense volume reduction during incineration process is especially difficult, where an inhomogeneous mixture of completely incinerated and only partially incinerated areas results. Also the fact that evaporating harmful gases are absorbed by the ashes and thereby contaminate them is a problem which is not controllable using the state of the art.

The fundamental advantage is that the preparation according to the invention is already guaranteed free of harmful substances during the production process, since for example a crystallization process cannot be applied as a purification step because important trace elements/minerals would be lost in the process.

The process according to the invention for the production of multi-component mineral substance preparations, which are free of harmful substances, contains in particular the following steps:

- a. Primary oxidation of organic raw materials of plant or animal origin in of a primary temperature treatment zone
- b. Conditioning of the primary oxidized materials
- c. Transport of the primary oxidized materials into a secondary temperature treatment zone
- d. Secondary oxidation of the primary oxidized materials in a secondary temperature treatment zone

Furthermore the invention describes an apparatus for producing mineral substance preparations with the following features:

- 5 a. An apparatus for introducing primary oxidized material of plant or animal origin
- b. A conveyor unit by which the primarily oxidized material is transported
- c. A transport channel in which the primarily oxidized
- 10 material is transported
- d. A heating zone
- e. An exhaust air channel

Due to the two-phase nature of the process, a defined retention time behaviour for all elements to be mineralised, especially in the secondary oxidation process, is achieved, which makes it easier to obtain an uncontaminated end product. The primary phase is carried out in a temperature range of between 500° and 3000°C, whereby the organic material is preferably oxidized with air at 500° - 1500°C. In

15 this process, a maximum of 40%, preferably a maximum of 10% of the original carbon content remains as organically bound carbon.

Advantageous in the process according to the invention is the continuous or quasi-continuous operation, at least in the secondary oxidation. Quasi-continuously in the sense of the description of the invention means that the primarily oxidized material can also be transported or forced under pressure through the secondary oxidation step.

25

The conditioning of the primary oxidized materials for the secondary oxidation step is advantageous. It requires a highly homogenous powder matrix in order to finally reach a very uniform retention time during the secondary oxidation. With a uniform and defined retention time for the secondarily

30

oxidized materials as well as the homogenous retention time of the resultant waste gases, a process is achieved which finally enables a pure product free from harmful substances with a justifiable expenditure of effort. An important fluid  
5 dynamic parameter in this process is the flow behaviour of the oxidation gases. The flow of the gas defines the powder matrix of the primarily oxidized materials, whereby the gas flow speed lies between 1 mm/s and 4 m/s, preferably between 2 cm/s and 1m/s.

10 The conveyor unit with which the primarily oxidized material passes into the secondary temperature treatment zone conditions the material by compressing it, whereby a pressure between 1 kPa and 10.000 kPa is built up. This conditioning/  
compressing is important for the uniform retention time  
15 behaviour and also for the defined flow of the mineral matrix waste gases which are generated during the secondary oxidation. It is additionally advantageous to select the direction of flow of the waste gases so that it is parallel to the direction of movement of the primary oxidate in the  
20 secondary oxidation process. Although one could technically strive for a counter-current flow behaviour in the process, there are no practical reasons for doing it. Especially advantageous is a vertical movement of the primary oxidate as well as of the waste gases directed upwards, since in this  
25 way the temperature load on the conveyor unit can be restricted.

The conditioning of the primarily oxidized materials could optionally be achieved by sieving off the coarser particles  
30 which may have possibly not be completely converted during the secondary oxidation. It is advantageous in this process to choose a sieve that allows only particles smaller than 1 mm, preferably smaller than 0.2 mm to enter into the

secondary temperature treatment zone.

As a part of this conditioning, the temperature of the primary oxidate sinks by at least 50°C, preferably by at  
5 least 100°C, and particularly preferably by at least 300°C.

During the primary oxidation in accordance with the invention, a volume reduction by at least 65%, preferably by at least 80% takes place, which very much simplifies the  
10 handling and the controllability of the process in the following treatment.

The term primary oxidate is understood in the sense of this patent application as the intermediate product which results  
15 between the maximum temperature of the primary and the maximum temperature of the secondary oxidation step.

After the second maximum temperature iteration, the product is referred to as a secondary oxidate. In this process, the  
20 secondary oxidation is preferably carried out in an externally heated tube or ring aperture through which the primary oxidate is conveyed for example through a rotating auger in a tube. Additionally, a slidegate valve or piston slide system are suitable as a transport system, but also  
25 good is a revolving tube, in which the conveyor unit, transport channel and heating zone are united together in one unit, if it is heated simultaneously. It is advantageous if it is heated externally, but directing injecting combustion gases into excess oxygen is also possible.

30

In addition, it is advantageous to carry out the secondary oxidation using enriched or pure oxygen, water steam or a similar mixture, which lowers the oxidation temperature and the significantly reduces or prevents the formation of NOx or

nitrates/nitrites. Here the apparatus is optionally equipped with a gas supply, whereby the suitable oxidation gas/mix is introduced into the oxidation area in a defined fashion. Decisive for the quality of the end product are the retention  
5 time behaviour and the flow velocity of the primary oxidate in the secondary temperature treatment zone. The throughput rate for a flying ash oxidation process lies between 0.1 and 4 m/s, and for a fluidized bed process between 0.01 m/h and 3 m/min, preferably between 1 m/h and 1m/min. Regarding the  
10 length of the heating zone for the secondary temperature treatment areas, for a fluidized bed process, this means retention times of 5 s for very small layer thickness of primary oxidate and up to 48 h for very large layer thicknesses. The layer thickness here vary between 1 mm and  
15 50 cm, and are preferably between 5 mm and 5 cm.

For a flying ash oxidation process, typical retention times in the secondary temperature treatment zone lie between 0.1 s and 2 min, preferably between 0.5 and 60 s.

Optionally, if not preferred, the primary oxidation may be  
20 carried out in the same apparatus as the secondary oxidation. In accordance with the invention, primary oxidation can also be carried out at a completely different location, for example at the site of the harvest of the basic plant materials. This allows optimization of transport costs to a  
25 central secondary oxidation plant. The time interval between primary and secondary oxidation is therefore preferably greater than one day, but if the primary oxidation is continuously carried out, the interval can be only a few seconds, preferably at least 5 s.

30

It is additionally advantageous to flush the secondary oxidate in water and to treat it with ozone and/or hydrogen peroxide in order to eliminate any traces of organic

impurities which may be still present. Optionally in the process of flushing or extracting by a defined addition of CO<sub>2</sub> or alkali carbonates or hydrogen carbonates, the formation of difficult to dissolve calcium carbonate is inhibited. This ultimately improves the solubility of the mineral preparation in the body to a considerable level even at high doses and therefore counteracts the hardening of the arteries or the formation of kidney, urine and gall stones.

It is additionally advantageous to make the minerals as bio-available as possible and to separate them from insoluble and absorbable silicic acid, silicon dioxide and silicates. Even when little is still understood about the health aspect of these substances, it can be sensible to separate them from the other minerals.

Additionally is it sensible to set the pH value of the preparations in such a way, that they are bio-compatible. Also the preparation can be broken up into various classes using fractioned extraction: extraction using pure water produces an extract with a high potassium and sodium content. A lightly acidic extraction leads to the enrichment of calcium and magnesium as well as to less easily soluble trace elements such as iron. An alkaline extraction using ammonia leads to a calcium or magnesium-poor preparation, which nevertheless is very rich in trace elements. In this way, different multi-component mineral substance preparations can be specifically produced for various medical indications.

Finally a last production step, which drastically increases the bio-availability of especially the trace elements, is also an option. The following elements are to be considered trace minerals according to their chemical abbreviations:



Li, Rb, Cs, Be, Sr, Ba, Sc, Y, La, Ti, Zr, Hf, V, Nb, Ta, Cr,  
Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag,  
Au, Zn, Cd, Ga, In, Tl, Ge, Sn, As, Sb, Bi, Se, Te, Ce, Pr,  
5 Sm, Eu, Gd, Tb, Yb, Lu

Trace elements in cluster form are much easier for the body  
to absorb. For this reason, the diluted alkaline, neutral or  
acidic solution is optionally treated with at least one  
10 reduction agent. Examples of reduction agents include  
hydrogen, sulphur dioxide, hydrazine, glucose, aldehydes,  
lactose, etc. The effervescence of hydrogen in the  
corresponding solution has shown itself to be advantageous.  
Thereby it is sensible to add a suitable inoculation colloid  
15 to the solution, which considerably accelerates the reduction  
process. These solutions indicate a redox potential of + 0.0  
V to 2.0 V, preferably of +0.1 V to 1.5 V, especially  
preferably of 0.2V to 1 V in comparison to a normal hydrogen  
electrode. The reduction time can be used to control cluster  
20 size. The cluster preparations prepared according to the  
invention consist of 5 to 1,000,000 atoms/ions, preferably of  
10 to 8,000 and especially preferably of 12 to 600. The  
average diameter of the clusters lies between 0.3 nm and 500  
nm, preferably between 0.7 and 100 nm. These clusters can  
25 consist of one or more trace elements.

Finally the solution can either be concentrated by  
evaporation and used as a salt or powder in different ways,  
or the colloidal solution can be used directly, e.g. orally  
30 ingested.

The cluster size and also the size of the colloidal particles  
can be determined via the light refraction on the colloidal  
solution, amongst other things. Here one may additionally

avail oneself of the theories of Rayleigh and of Debye's extended Rayleigh Theory or also of the theory of Zimm, which correlates the relationship between irradiated and diffused light with the particle size of the colloids - for more on this subject, see *Physikalische Chemie*; W. J. Moore and D.O. Hummel, Walter de Gruyter, 1983, p. 1158 ff. Additional methods for determining cluster size include determining the sedimentation rate in an ultra high speed centrifuge, preferably with optical measuring instrumentation, as well as electrophoresis.

According to the invention, the process can also be carried out in batch mode with two different heating zones, however at least a partially continual process control is preferred, wherein preferably the secondary oxidation is continually running. An application example is illustrated in Figure 1.

Description of Figure 1: The primary oxidized material is transported through a rotating auger and pushed through a vertically placed heating zone. This means that the heating zone can be brought up to a temperature of between 300° and 3000°C using electrical resistances or also inductively or even using electro-magnetic radiation or gas or oil firing.

The O<sub>2</sub>-partial pressure in the primary oxidized material is preferably increased by injecting of oxygen or oxygen-enriched air. This not only reduces the temperature necessary in the heating zone but also considerably reduces the formation of NO<sub>x</sub>. This finally results in a very slight nitrate/nitrite concentration in the final product in conjunction with the resulting, very uniform and narrow retention time range.

As an alternative to indirect heating, direct heating with gas - preferably with a hydrogen/oxygen mix - can be done, wherein in this example a fly ash oxidation of the primary oxidized material is carried out. However this method is  
5 technically more complex because the secondarily oxidized material must again be removed from a much greater volume flow, and furthermore, it requires more energy. Primary oxidation not technically complex. In principle, this process can be carried out in a simple oven or even in a smoke stack.

10

What is important here is only that the incineration process has already essentially been executed. Only then is it possible to carry out the secondary oxidation in a technically defined manner and to coordinate the simultaneous  
15 transport of primary/secondary oxidate and exhaust gases.

A great advantage to this process is also the simple controllability and ratability of the process. Since the waste gas flows completely through the powder matrix of the  
20 secondary oxidate, the level of harmful substances in the waste gases corresponds to the level of harmful substances in the product. For this reason, it also is possible to monitor the specific product quite well using an appropriate gas analysis technique, preferably gas chromatography with an  
25 attached mass spectroscopic detector with the help of waste gas monitoring.

Furthermore, the process according to the invention encompasses a variant, where the plants are already primarily  
30 oxidized at the site of harvest, the primary oxidate is transported to the site of the secondary oxidation and there is further processed according to the process described. The quality of the product can easily be determined by the ratio of the sum of potassium and sodium ions to the nitrate

concentration. The latter can be easily analyzed when the nitrate is reduced to nitrite and then sulfanilic acid is added. Due to the intensive coloring of the resulting azo preparation, the nitrate content can easily be determined.

5

A qualitatively high quality preparation exhibits a (Na+K) / (NO<sub>3</sub>) ratio (short: NaKNO) greater than 1,000, preferably greater than 10,000, and especially preferably greater than 100,000.

10

It is not possible to produce NaKNO values greater than 1000 by simply incinerating plant components.

15

Using the process according to the invention, particularly when pure oxygen flows into the temperature treatment zone, NaKNO values of between 10,000 and 100,000 have been determined.

20

A further characteristic of the product is the ratio of potassium + sodium to organically-bound carbon: Carbon compounds that survive the high temperatures of production are barely still biologically degradable and are usually extremely toxic. These organic residues are determined using the normal methods used in organic chemistry in the area of trace analysis. Mineral substance preparations produced accordingly can of course be mixed with other minerals, wherein normally at least 2% of the mineral substance preparation produced according to the invention is mixed in with the commercially-available mineral substance preparations, whereby the balance of the commercially-available preparations is clearly increased.

30

Of course, the quality of any food can also be improved by adding mineral substance preparations produced according to

the invention.

Basically all plants and, in this case, also all parts of plants can be used as raw materials; less preferable, but  
5 still quite feasible is the use of specific animals or parts of animals such as bone or specific organs. From a medicinal standpoint the use of special plants or parts of animals is therefore important since there are those who would specifically like to implement the "natural" enrichment of a  
10 number of trace elements for therapeutic purposes. Especially high quality raw materials include grasses from certain mountain pastures that have not hitherto been intensively cultivated as well as sea algae. Other high quality raw materials include leaves such as olive tree leaves, maple  
15 leaves, birch leaves, stinging nettle, aloe vera, thyme, etc. Especially preferable are root and root parts, for example, of wild and/or forest herbs, ginseng, etc. Also fungi and mycelium.

20 Mineral substances that are produced according to the process described in the invention are suitable as a broad spectrum medication also for remedies for which colloidal silver is recommended. Preparations produced according to the invention are especially effective for the following indications: Heavy  
25 metal poisoning, chronic nausea, migraine, allergies, cardiovascular diseases, high blood pressure. In connection with this, experts have observed a strong correlation between a deficiency in trace elements and the occurrence of disease.

30 The advantages of the process with respect to prior art can be described in summary as follows:

For the first time multi-component mineral substance preparations of natural origin and free of harmful substances

are available. A balanced, natural graduation of minerals and trace elements, as an optimal nutritional supplement to frequently demineralized food, helps refill the body's own mineral substance stores. In this way users strengthen their  
5 immune system.

A "natural mineral substance cocktail" is better tolerated during mineralization cures, without health-damaging situations occurring, since no unilateral strain can develop.  
10 Due to the high potassium/sodium levels body fluids are alkalized, i.e. the body ph increases and waste products are released resulting in the following: Good blood pressure regulation; prophylactic effect against cardio-vascular diseases; Increases the oxygenation of the cells; Increases  
15 the energy in the body - increases the level of health and fitness.

**Application example:**

20 **Apparatus:** An apparatus consisting of one spiral conveyor with a 5 cm long auger, with a diameter of 20 mm, which is equipped with a tube with a diameter of 22 mm. The tube runs horizontally approx. 80 mm and then curves upward, wherein the vertical part amounts to approx. 800 mm. Furthermore in  
25 the horizontal area, a gas feed for pure oxygen is attached that is protected from the primary oxidate by a particle filter  $< 0.2 \mu\text{m}$ . The vertical part is surrounded by a tube furnace; height approx. 500 mm, tube diameter 40 mm. At the end of the vertical tube, a manifold is screwed on that,  
30 according to Image 1, carries off the primary oxidate being cooled downwards and draws the exhaust air upwards through an exhaust exit. Furthermore a thermocouple in the heating zone determines the approx. internal temperature in the middle of the tube. A GC with mass spectrometer attached to the exhaust

air duct determines the composition of the exhaust air.

Process: 50 kg of dried mountain grasses is burned in a fireplace; the obtained primary oxidate that still smells  
5 strongly of burned/smoked material is sieved to 0.2 mm - yield 3.2 kg. The primary oxidate sieved out is placed on the spiral conveyor using a hopper. Furthermore 99.9% pure oxygen at approx. 5 l/min is added to the gas feed. The exterior temperature of the tube in the heating zone has been set to  
10 1200°C. The transport rate in reference to the secondary oxidate amounted to 1 - 2 g/min. The internal temperature amounted to 825°C. At these parameters, no contaminants were observed in the waste gas, only CO<sub>2</sub> and traces of CO. An analysis of the secondary oxidate produced for the presence  
15 of nitrate was negative. 10 g of the secondary oxidate produced were dissolved in 1 l of water, decanted, and then filled again with 1 l of hot water and adjusted with citric acid to a pH index of approx. 3. The first extract solution has positive effects on the following: blood pressure;  
20 prophylactic effect against cardio-vascular diseases; increases the oxygenation of the cells; increases the energy in the body - increases the level of health and fitness.

#### **Application example:**

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30 the vertical part amounts to approx. 800 mm. Furthermore in the horizontal area, a gas feed for pure oxygen is attached that is protected from the primary oxidate by a particle filter < 0.2 µm.

The vertical part is surrounded by a tube furnace; Height approx. 500 mm, tube diameter 40 mm. At the end of the vertical tube, a manifold is screwed on that, according to Image 1, carries off the primary oxide being cooled  
5 downwards and draws the exhaust air upwards through an exhaust exit. Furthermore, a thermocouple in the heating zone determines the approx. internal temperature in the middle of the tube. A GC with mass spectrometer attached to the exhaust air duct determines the composition of the exhaust air.

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15 spiral conveyor using a hopper. Furthermore 99.9% pure oxygen at approx. 5 l/min is added to the gas feed. The exterior temperature of the tube in the heating zone has been set to 1200°C. The transport rate in reference to the secondary oxide amounted to 1 - 2 g/min. The internal temperature  
20 amounted to 825°C. At these parameters, no contaminants were observed in the waste gas, only CO<sub>2</sub> and traces of CO. An analysis of the secondary oxide produced for the presence of nitrate was negative. 10 g of the secondary oxide produced were dissolved in 1 l of water, decanted, and then  
25 filled again with 1 l of hot water and adjusted with citric acid to a pH index of approx. 3. The solution is treated as follows during the extraction:

- 3: Injection of air, O<sub>2</sub>-enriched air, pure O<sub>2</sub>
- 30 4: Introduction of primarily oxidized material
- 5: Drive unit for the spiral conveyor
- 6: Transport shaft
- 7: Transport tube
- 8: Installed components for increasing the blending or



- improving the heat transfer
- 9: Secondarily oxidized material
- 10: Exhaust air tube
- 11: Waste gas
- 5 12: Cycled air
- 13: Direction of transport

10 In the following, further aspects of the invention are described:

1. Method for manufacturing multi-component mineral substance preparations free of harmful substances comprising the following steps:
  - 15 a. Primary oxidation of organic raw materials of plant or animal origin in a primary temperature treatment zone
  - b. Conditioning of the primarily oxidized material
  - c. Optional transport of the primarily oxidized material into
    - 20 a secondary temperature treatment zone
    - d. Secondary oxidation of the primarily oxidized material into a secondary temperature treatment zone
2. Process according to point 1, characterized in that the
  - 25 primarily oxidation is carried out at a temperature of between 500°C and 3000°C.
3. Process according to at least one of the aforementioned points, characterized in that after the primary oxidation, a
  - 30 maximum 40% of the original carbon content remains as organically bound carbon.
4. Process according to at least one of the aforementioned points, characterized in that gas flows through the matrix of

the primary oxidate in the secondary temperature treatment zone.

5 5. Process according to at least one of the aforementioned points, characterized in that the gas flow rate lies between 1 mm/s and 4 m/s, preferably between 2 cm/s and 1m/s.

6. Process according to at least one of the aforementioned claims, characterized in that the secondary oxidation is  
10 continually carried out.

7. Process according to at least one of the aforementioned points, characterized in that the primarily oxidized material is compressed, wherein a pressure of between 1 kPa and 10,000  
15 kPa is used.

8. Process according to at least one of the aforementioned points, characterized in that the primarily oxidized material, after it has been passed through the primary  
20 temperature level, is cooled by at least 50°C.

9. Process according to at least one of the aforementioned points, characterized in that, during primary oxidation, a volume reduction of at least 65% occurs.

25 10. Process according to at least one of the aforementioned points, characterized in that the primarily oxidized material is graded with a sieve before it is introduced into the secondary temperature level.

30 11. Process according to at least one of the aforementioned points, characterized in that only particles smaller than 1 mm preferably smaller than 0.2 mm are introduced into the secondary temperature level.

12. Process according to at least one of the aforementioned points, characterized in that a cooling down stage of at least 100°C, preferably more than 300°C between the primary  
5 oxidation and the secondary oxidation occurs.

13. Process according to at least one of the aforementioned points, characterized in that, during primary oxidation, a reduction in organic carbon of about at least 90% and a  
10 volume reduction of at least 80% occurs.

14. Process according to at least one of the aforementioned points, characterized in that the primary oxidate in the secondary oxidation level is moved through a channel, for  
15 instance, through a tube that is externally heated or that the introduction of energy originates externally.

15. Process according to at least one of the aforementioned points, characterized in that the primary temperature treatment zone and the secondary temperature treatment zone  
20 are identical.

16. Process according to at least one of the aforementioned points, characterized in that the primary oxidate as well as  
25 the exhaust gases in the second temperature treatment zone are moving in the same direction.

17. Process according to at least one of the aforementioned claims, characterized in that the secondary oxidation is  
30 carried out using enriched or pure oxygen and/or water steam.

18. Process according to at least one of the aforementioned points, characterized in that the flow rate of the primary oxidate through the secondary temperature treatment zone

amounts to between 4 m /s and 0.01 m/h, based on the area available in the heating zone.

19. Process according to at least one of the aforementioned  
5 points, characterized in that, in a fluidized bed process, the flow rate of the primary oxidate through the second temperature treatment zone amounts to preferably between 1 m/min and 1m/h.

10 20. Process according to at least one of the aforementioned points, characterized in that the material that has gone through secondary oxidation, in particularly for producing clusters, is partially dissolved or extracted in alkaline, neutral or acidic diluted solutions.

15 21. Process according to at least one of the aforementioned points, characterized in that ozone and/or hydrogen peroxide is introduced into the diluted solution.

20 22. Process according to at least one of the aforementioned points, characterized in that the maximum temperatures of the primary oxidation and the secondary oxidation occur longer than a second, preferably longer than 1 minute and especially preferably longer than one day apart.

25 23. Process according to at least one of the aforementioned points, characterized in that the diluted solution of the secondary oxidation or of the corresponding extract is treated reductively.

30 24. Process according to point 23, characterized in that the redox potential of the solution shifts about - 0.1 to - 2 V when measured with a platinum electrode, as opposed to a standard hydrogen electrode.

25. Apparatus for producing mineral substance preparations, comprising:

- 5 a. An apparatus for introducing primarily oxidized material of plant or animal origin
- b. A conveyor unit for transporting primarily oxidized material
- c. A transport channel in which primarily oxidized material  
10 is transported
- d. A heating zone
- e. An exhaust air channel

26. Apparatus according to at least one of the aforementioned  
15 points, characterized in that the heating zone is heated to a temperature of between 300°C and 3000°C.

27. Apparatus according to at least one of the aforementioned  
points, characterized in that it is continually or quasi-  
20 continually operated.

28. Apparatus according to at least one of the aforementioned  
points, characterized in that it also includes a gas feed.

25 29. Apparatus according to at least one of the aforementioned  
points, characterized in that the heating zone is indirectly  
heated with gas and/or electrically.

30 30. Apparatus according to at least one of the aforementioned  
points, characterized in that the primarily oxidized material  
in the heating zone has a retention time of 5 s - 48 h.

31. Mechanism according to at least one of the aforementioned  
points, characterized in that oxygen gas with an oxygen

concentration of at least 90 Vol.% is connected to the gas feed.

32. Mechanism according to at least one of the aforementioned  
5 points, characterized in that transport unit, transport channel and heating zone are unified in a heated slew tube.

33. Apparatus according to at least one of the aforementioned  
10 points, characterized in that the heating zone has a channel, i.e. tube or annular gap.

34. Apparatus according to at least one of the aforementioned  
points, characterized in that, in the heating zone, the  
15 primarily oxidized material has a coating thickness of between 1 mm and 50 cm, preferably between 5 mm and 5 cm.

35. Apparatus according to at least one of the aforementioned  
points, characterized in that the primarily oxidized material  
20 is heated directly using a gas flame which contains excess oxygen.

36. Apparatus according to at least one of the aforementioned  
points, characterized in that the primarily oxidized material  
25 exhibits a contact time in the heating zone of 0.1 s - 5 min., preferably between 0.5 s and 60 s.

37. Apparatus according to at least one of the aforementioned  
points, characterized in that the conveyer system has a slew  
30 tube or spiral conveyor or pushing element.

38. Mineral substance preparations producible or manufactured  
in accordance with one method according to points 1-24,  
characterized in that they exhibit a (K+Na) / C(organic) mass  
ratio of > 100, preferably > 1,000 and especially preferably

> 10,000.

39. Mineral substance preparations producible or produced in line with one process according to points 1-24, characterized in that they contain trace elements in colloidal form.

40. Mineral substance preparations according to a least one of the aforementioned points, characterized in that they exhibit a  $(K + Na)/\text{nitrate}$  ratio of  $> 1000$  preferably  $> 10,000$  and especially preferably  $> 100,000$ .

41. Mineral substance preparations according to at least one of the aforementioned points, characterized in that they exhibit a redox potential of  $+ 0.0 \text{ V}$  to  $2.0 \text{ V}$ , preferably of  $+0.1 \text{ V}$  to  $1.5 \text{ V}$ , especially preferably of  $0.2 \text{ V}$  to  $1 \text{ V}$  with respect to a standard hydrogen electrode in a diluted solution.

42. Mineral substance preparations according to at least one of the aforementioned points, characterized in that they contain clusters of trace elements.

43. Mineral substance preparations according to at least one of the aforementioned points, characterized in that they consist of one or more trace elements.

44. Mineral substance preparations according to at least one of the aforementioned points, characterized in that the mean diameter of the clusters lies between  $0.3 \text{ nm}$  and  $500 \text{ nm}$ , preferably between  $0.7$  and  $100 \text{ nm}$ .

45. Mineral substance preparations, according to at least one of the aforementioned points, are characterized in that these clusters comprise of  $5$  to  $1,000,000$  atoms/ions, preferably of

10 to 8,000 and especially preferably of 12 to 600.

46. Mineral substance preparations, which according to points 38-45 are characterized in that they are mixed or blended at  
5 a maximum of 98% with other minerals and salts or with corresponding mineral substance mixtures in diluted or alcoholic solutions.

47. Mineral substance preparations, according to at least one  
10 of the claims 1-24 used as a nutritional supplement, food additive, beauty aid, medication, whereby intake can be in particular either in oral, inhalative, intravenous, rectal or topical form.

48. Mineral substance preparations, according to at least one  
15 of the points 38-46 that can be used as a nutritional supplement, food additive, beauty aid, medication, whereby intake can be in particular either in oral, inhalative, intravenous, rectal or topical form.

49. The use of a mineral substance preparation according to  
20 either points 47 or 48 for the treatment of heavy metal poisoning, hair loss, chronic nausea, migraine, allergies, cardio-vascular diseases, high blood pressure, wherein  
25 mineral substance preparations are prescribed to patients in particular in oral, rectal or intravenous form.

Legend:

The following elements are to be considered trace minerals  
30 according to their chemical abbreviations:  
Li, Rb, Cs, Be, Sr, Ba, Sc, Y, La, Ti, Zr, Hf, V, Nb, Ta, Cr,  
Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag,  
Au, Zn, Cd, Ga, In, Tl, Ge, Sn, As, Sb, Bi, Se, Te, Ce, Pr,  
Sm, Eu, Gd, Tb, Yb, Lu. 38